

## CLAIMS

What is claimed is:

1. An allergy vaccine comprising at least one protein selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in production of IgE in a mammal, a receptor for an interleukin involved in production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, a leukotriene receptor, in a pharmaceutically-acceptable carrier.
2. The allergy vaccine of claim 1, wherein said mammal is selected from the group consisting of a human, a non-human primate, a horse, a cow, a pig, a goat, a dog, a cat, a rodent.
3. The allergy vaccine of claim 2, where said mammal is a human.
4. The allergy vaccine of claim 1, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10, and IL-13.
5. The allergy vaccine of claim 4, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, and IL-13.
6. The allergy vaccine of claim 4, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, and IL-13.
7. The allergy vaccine of claim 4, wherein said interleukin is selected from the group consisting of IL-4, IL-5, and IL-13.
8. The allergy vaccine of claim 4, wherein said interleukin is selected from the group consisting of IL-4 and IL-5.

9. The allergy vaccine of claim 4, wherein said interleukin is IL-4.
10. The allergy vaccine of claim 1, said vaccine further comprising interferon gamma.
11. The allergy vaccine of claim 1, wherein said interleukin receptor is selected from the group consisting of an IL-3 receptor, an IL-4 receptor, an IL-5 receptor, an IL-6 receptor, an IL-10 receptor, and an IL-13 receptor.
12. An allergy vaccine comprising at least one ingredient selected from the group consisting of an interleukin involved in production of IgE in a mammal, and a receptor for an interleukin involved in production of IgE in a mammal, in a pharmaceutically-acceptable carrier.
13. The allergy vaccine of claim 12, said vaccine further comprising interferon gamma.
14. An allergy vaccine comprising at least one ingredient selected from the group consisting of an IgE, an IgE receptor, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, in a pharmaceutically-acceptable carrier.
15. The allergy vaccine of claim 14, said vaccine further comprising interferon gamma.
16. An allergy vaccine comprising at least one isolated nucleic acid encoding a protein selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in production of IgE in a mammal, a receptor for an interleukin involved in production of IgE in a mammal, an interferon-alpha, an interferon-alpha

receptor, a histamine, a histamine receptor, a leukotriene, a leukotriene receptor, in a pharmaceutically-acceptable carrier.

17. The allergy vaccine of claim 16, said vaccine further comprising interferon gamma.

18. The allergy vaccine of claim 16, said isolated nucleic acid further comprising a promoter/regulatory sequence operably linked thereto.

19. The allergy vaccine of claim 18, said isolated nucleic acid further comprising a vector.

20. A method of preventing an allergic response in a mammal, said method comprising administering to said mammal an allergy vaccine comprising at least one ingredient selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor for an interleukin involved in the production of IgE in a mammal, an interferon alpha, an interferon alpha receptor, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby preventing an allergic response in a mammal.

21. The method of claim 20, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10, and IL-13.

22. The method of claim 21, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, and IL-13.

23. The method of claim 22, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, and IL-13.

24. The method of claim 23, wherein said interleukin is selected from the group consisting of IL-4, IL-5, and IL-13.
25. The method of claim 24, wherein said interleukin is selected from the group consisting of IL-4 and IL-5.
26. The method of claim 25, wherein said interleukin is IL-4.
27. The method of claim 20, said method further comprising administering interferon gamma to said mammal.
28. A method of preventing an allergic response in a mammal, said method comprising administering to said mammal an allergy vaccine comprising at least one nucleic acid encoding an ingredient selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor for an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby preventing an allergic response in a mammal.
29. The method of claim 28, said isolated nucleic acid further comprising a promoter/regulatory sequence operably linked thereto.
30. The method of claim 28, said isolated nucleic acid further comprising a vector.
31. The method of claim 28, said method further comprising administering interferon gamma to said mammal.

32. A method of treating an allergy in a mammal, said method comprising administering to said mammal an allergy vaccine comprising at least one ingredient selected from the group consisting of an interleukin involved in the production of IgE in a mammal, and a receptor for an interleukin involved in the production of IgE in a mammal, thereby treating an allergy in a mammal.

33. The method of claim 32, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10, and IL-13.

34. The method of claim 32, said method further comprising administering interferon gamma to said mammal.

35. A method of treating an allergy in a mammal, said method comprising administering to said mammal an allergy vaccine comprising at least one ingredient selected from the group consisting of IgE, an IgE receptor, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby treating an allergy in a mammal.

36. The method of claim 35, said method further comprising administering interferon gamma to said mammal.

37. A method of preventing an allergic response in a mammal, said method comprising administering to said mammal at least one ingredient selected from the group consisting of an anti-interleukin compound which is not an anti-interleukin antibody, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, thereby preventing an allergic response in a mammal.

38. The method of claim 37, wherein said anti-interleukin compound is selected from the group consisting of a soluble interleukin receptor, and an antibody to an interleukin receptor.

39. The method of claim 38, wherein said interleukin involved in the production of IgE is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10, and IL-13.

40. The method of claim 37, said method further comprising administering interferon gamma to said mammal.

41. A method of treating an allergy in a mammal, said method comprising administering to said mammal at least one ingredient selected from the group consisting of an anti-IgE antibody, an anti-IgE receptor antibody, a soluble IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, thereby treating an allergy in a mammal.

42. The method of claim 41, wherein said interleukin involved in the production of IgE is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10 and IL-13.

43. The method of claim 41, wherein said interleukin receptor is selected from the group consisting of an IL-3 receptor, an IL-4 receptor, an IL-5 receptor, an IL-6 receptor, and IL-10 receptor, and an IL-13 receptor.

44. The method of claim 41, wherein said antibody to an interleukin receptor is selected from the group consisting of an antibody to an IL-3 receptor, an

antibody to an IL-4 receptor, an antibody to an IL-5 receptor, an antibody to an IL-6 receptor, an antibody to an IL-10 receptor, and an antibody to an IL-13 receptor.

45. The method of claim 41, said method further comprising administering interferon gamma to said mammal.

46. A method of treating an allergy in a mammal, said method comprising administering to said mammal at least one antisense nucleic acid complementary to a nucleic acid encoding a protein selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor to an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby treating an allergy in a mammal.

47. The method of claim 46, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10 and IL-13.

48. The method of claim 46, said method further comprising administering interferon gamma to said mammal.

49. A kit for preventing an allergic response in a mammal, said kit comprising at least one allergy vaccine wherein said allergy vaccine comprises a protein selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE, a receptor for an interleukin involved in the production of IgE, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, an applicator, and an instructional material for the use thereof.

50. The kit of claim 49, said kit further comprising interferon gamma.

51. A kit for preventing an allergic response in a mammal, said kit comprising an allergy vaccine wherein said allergy vaccine comprises at least one nucleic acid encoding IgE, an IgE receptor, an interleukin involved in the production of IgE, a receptor for an interleukin involved in the production of IgE, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE, an applicator, and an instructional material for the use thereof.

52. The kit of claim 51, said kit further comprising interferon gamma.

53. A kit for treating an allergy in a mammal, said kit comprising an at least one ingredient selected from an anti-IgE antibody, an anti-IgE receptor antibody, a soluble IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, an applicator, and an instructional material for the use thereof.

54. The kit of claim 53, said kit further comprising interferon gamma.

55. A kit for treating an allergy in a mammal, said kit comprising an antisense nucleic acid complementary to a nucleic acid encoding at least one ingredient selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor to an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, an applicator, and an instructional material for the use thereof.

56. The kit of claim 55, said kit further comprising interferon gamma.

57. A method of inhibiting production of IgE in a mammal, said method comprising administering to said mammal at least one ingredient selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor for an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby inhibiting IgE production in a mammal.

58. The method of claim 57, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10, and IL-13.

59. The method of claim 57, said method further comprising administering interferon gamma to said mammal.

60. A method of inhibiting production of IgE in a mammal, said method comprising administering to said mammal at least one nucleic acid encoding a protein selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor for an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby inhibiting IgE production in a mammal.

61. The method of claim 60, said method further comprising administering interferon gamma to said mammal.

62. A method of inhibiting production of IgE in a mammal, said method comprising administering to a mammal at least one ingredient selected from the group consisting of an anti-IgE antibody, an anti-IgE receptor antibody, a soluble

IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, thereby inhibiting production of IgE in a mammal.

63. The method of claim 62, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10 and IL-13.

64. The method of claim 63, said method further comprising administering interferon gamma to said mammal.

65. A method of inhibiting production of IgE in a mammal, said method comprising administering to said mammal at least one antisense nucleic acid complementary to a nucleic acid encoding a protein selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor to an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, thereby inhibiting production of IgE in a mammal.

66. The method of claim 65, wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10 and IL-13.

67. The method of claim 66, said method further comprising administering interferon gamma to said mammal.

68. A kit for inhibiting production of IgE in a mammal, said kit comprising at least one protein selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE, a receptor for an interleukin involved in the production of IgE, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, an applicator, and an instructional material for the use thereof.

69. The kit of claim 68, said kit further comprising interferon gamma.

70. A kit for inhibiting production of IgE in a mammal, said kit comprising an isolated nucleic acid encoding at least one protein selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE, a receptor for an interleukin involved in the production of IgE, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE, an applicator, and an instructional material for the use thereof.

71. The kit of claim 70, said kit further comprising interferon gamma.

72. A kit for inhibiting production of IgE in a mammal, said kit comprising at least one ingredient selected from an anti-IgE antibody, an anti-IgE receptor antibody, a soluble IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, an applicator, and an instructional material for the use thereof.

73. The kit of claim 72, said kit further comprising interferon gamma.

74. A kit for inhibiting production of IgE in a mammal, said kit comprising an antisense nucleic acid complementary to a nucleic acid encoding at least one ingredient selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor to an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, an applicator, and an instructional material for the use thereof.

75. The kit of claim 74, said kit further comprising interferon gamma.

76. A kit for preventing an allergic response in a mammal, said kit comprising a pharmaceutical composition comprising at least one allergy vaccine in an amount effective for preventing an allergic response in a mammal in a pharmaceutically acceptable carrier, wherein said allergy vaccine comprises a protein selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE, a receptor for an interleukin involved in the production of IgE, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, an applicator, and an instructional material for the use thereof.

77. The kit of claim 76, said kit further comprising interferon gamma.

78. A kit for preventing an allergic response in a mammal, said kit comprising a pharmaceutical composition comprising an allergy vaccine in a pharmaceutically acceptable carrier in an amount effective for preventing an allergic response in a mammal, wherein said allergy vaccine comprises at least one nucleic acid encoding IgE, an IgE receptor, an interleukin involved in the production of IgE, a receptor for an interleukin involved in the production of IgE, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a

leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE, an applicator, and an instructional material for the use thereof.

79. The kit of claim 78, said kit further comprising interferon gamma.

80. A kit for treating an allergy in a mammal, said kit comprising a pharmaceutical composition comprising at least one protein in an amount effective for treating an allergy in a mammal in a pharmaceutically acceptable carrier, wherein said protein is selected from an anti-IgE antibody, an anti-IgE receptor antibody, a soluble IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, an applicator, and an instructional material for the use thereof.

81. The kit of claim 80, said kit further comprising interferon gamma.

82. A kit for treating an allergy in a mammal, said kit comprising a pharmaceutical composition comprising an antisense nucleic acid in an amount effective for treating an allergy in a mammal in a pharmaceutically acceptable carrier, wherein said antisense nucleic acid is complementary to a nucleic acid encoding at least one ingredient selected from the group consisting of IgE, an IgE receptor, an interleukin involved in the production of IgE in a mammal, a receptor to an interleukin involved in the production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, and a leukotriene receptor, an applicator, and an instructional material for the use thereof.

83. The kit of claim 82, said kit further comprising interferon gamma.

84. A pharmaceutical composition comprising at least one protein selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in production of IgE in a mammal, a receptor for an interleukin involved in production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, a leukotriene receptor, in a pharmaceutically-acceptable carrier in an amount effective for preventing an allergic response in a mammal.

85. The pharmaceutical composition of claim 84, said composition further comprising interferon gamma.

86. A pharmaceutical composition comprising at least one isolated nucleic acid encoding a protein selected from the group consisting of an IgE, an IgE receptor, an interleukin involved in production of IgE in a mammal, a receptor for an interleukin involved in production of IgE in a mammal, an interferon-alpha, an interferon-alpha receptor, a histamine, a histamine receptor, a leukotriene, a leukotriene receptor, in a pharmaceutically-acceptable carrier, in an amount effective for preventing an allergic response in a mammal.

87. The pharmaceutical composition of claim 86, said composition further comprising interferon gamma.

88. A pharmaceutical composition comprising at least one protein in an amount effective for treating an allergy in a mammal, wherein said protein is selected from the group consisting of an anti-IgE antibody, an anti-IgE receptor antibody, a soluble IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-

leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, in a pharmaceutically acceptable carrier.

89. The pharmaceutical composition of claim 88, said composition further comprising interferon gamma.

90. A method of treating an allergy in a mammal, said method comprising administering to said mammal at least one first ingredient selected from the group consisting of an anti-IL-3 antibody, an anti-IL-4 antibody, an anti-IL-5 antibody, an anti-IL-6 antibody, an anti-IL-10 antibody, and an anti-IL-13 antibody, and at least one second ingredient selected from the group consisting of an anti-IgE antibody, an anti-IgE receptor antibody, a soluble IgE receptor, an anti-interleukin receptor antibody, a soluble interleukin receptor, an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, a soluble interferon-alpha receptor, an anti-histamine antibody, an anti-histamine receptor antibody, a soluble histamine receptor, an anti-leukotriene antibody, an anti-leukotriene receptor antibody, and a soluble leukotriene receptor, wherein said interleukin is at least one interleukin involved in the production of IgE in a mammal, thereby treating an allergy in a mammal.

91. The method of claim 90, wherein said interleukin involved in the production of IgE is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10 and IL-13.

92. The method of claim 90, wherein said interleukin receptor is selected from the group consisting of an IL-3 receptor, an IL-4 receptor, an IL-5 receptor, an IL-6 receptor, and IL-10 receptor, and an IL-13 receptor.

93. The method of claim 90, wherein said antibody to an interleukin receptor is selected from the group consisting of an antibody to an IL-3 receptor, an

antibody to an IL-4 receptor, an antibody to an IL-5 receptor, an antibody to an IL-6 receptor, an antibody to an IL-10 receptor, and an antibody to an IL-13 receptor.

94. The method of claim 90, said method further comprising administering interferon gamma to said mammal.

95. A method of treating bronchial asthma in a human, said method comprising administering to said human at least one ingredient selected from the group consisting of an anti-interferon-alpha antibody, an anti-interferon-alpha receptor antibody, and a soluble interferon-alpha receptor, thereby treating bronchial asthma in a human.

96. The method of claim 95, said method further comprising administering to said human at least one ingredient selected from the group consisting of an anti-IgE antibody, an anti-IgE receptor antibody, and a soluble IgE receptor.

97. The method of claim 96, said method further comprising administering to said human at least one ingredient selected from the group consisting of an anti-histamine antibody, and anti-histamine receptor antibody, and a soluble histamine receptor.

98. The method of claim 97, said method further comprising administering interferon gamma to said human.

99. The method of claim 41, said method further comprising administering to said human an anti-interleukin antibody wherein said interleukin is selected from the group consisting of IL-3, IL-4, IL-5, IL-6, IL-10 and IL-13.